CS 478/564 COMPUTATIONAL GEOMETRY (Spring 2019-2020)

Instructor: Uğur Güdükbay
Office Hours: Monday 9:40-10:30, Wednesday 9:40-10:30 (EA-403)
Course Schedule: Tuesday 13:40, 14:40, Thursday 15:40, 16:40 (Spare Hour) (EE-03)
Course Assistant: Aytek Aman
Instructor’s e-mail: gudukbay@cs.bilkent.edu.tr
Office Number: EA-403, Tel: 1486

Please visit the course homepage frequently to see the announcements about the course and assignments.

SYLLABUS

1. Introduction
   - Algorithmic Background
   - Data Structures
   - Geometric Preliminaries
   - Models of Computation

2. Geometric Searching
   - Introduction
   - Point-Location Problems
   - Range-Searching Problems

3. Convex Hulls
   - Preliminaries
   - Problem Statement and Lower Bounds
   - Convex Hull Algorithms in the Plane
   - Graham’s Scan
   - Jarvis’s March
   - Quick Hull techniques
   - Dynamic Convex Hull
   - Convex Hull in 3D

4. Proximity Problem
   - A Collection of Problems
   - A Computational Prototype: Element Uniqueness
   - Lower Bounds
   - The Closest-Pair Problem: A Divide-and-Conquer Approach
   - The Voronoi Diagram
   - Proximity Problems Solved by the Voronoi Diagram
5. Triangulation
   - Planar Triangulations
     - Greedy Triangulations
     - Partitioning a Polygon into Monotone Pieces
     - Triangulating a Monotone Polygon
   - Delaunay Triangulation

6. Intersections
   - Application Areas
   - Planar Applications: Intersection of Convex Polygons, Star-shaped Polygons; Intersection of Line Segments.
   - 3D Applications: Intersection of 3D Convex Polyhedra; Intersection of Half-spaces

TEXTBOOK INFO
Main Textbooks:

References:

GRADING: (Tentative)
   - Midterm 20 %,
   - Final 30 %,
   - Assignments 20 %,
   - Project 25 %,
   - Attendance 5 %